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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/856,358	05/22/2001	Takehiko Kezuka	P07223US00/L	6873
881	7590	03/31/2004	EXAMINER	
STITES & HARBISON PLLC 1199 NORTH FAIRFAX STREET SUITE 900 ALEXANDRIA, VA 22314			UMEZ ERONINI, LYNETTE T	
			ART UNIT	PAPER NUMBER
			1765	

DATE MAILED: 03/31/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

AS

Office Action Summary	Application No.	Applicant(s)	
	09/856,358	KEZUKA ET AL.	
	Examiner	Art Unit	
	Lynette T. Umez-Eronini	1765	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
 - If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
 - If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
 - Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 23 December 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-16 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-16 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date <u>1/21/2004</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 12/22/2003 has been entered.

Priority

2. It is suggested that applicants update the current status of the present application.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 1, 2, 5-10, 13, and 14 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claim 1, lines 2-4, "wherein a ratio of an etch rate of . . ."

In claim 2, lines 1-2, " wherein a solvent in the etching solution . . .;"

In claim 5, lines 1-3, "wherein the weight ratio of . . ."

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In claim 6, lines 1-2, "wherein the weight ratio of . . ."

In claim 7, lines 1-2, "wherein the weight ratio of . . ."

In claim 8, lines 1-2, "wherein the weight ratio of . . ."

In claim 9, lines 1-2, "wherein the weight ratio of . . ."

In claim 10, lines 1-2, "wherein the weight ratio of . . ."

In claim 13, lines 1-2, "wherein the weight ratio of . . ." and

In claim 14, lines 1-2, "wherein the weight ratio of . . ." is indefinite because it is unclear whether the claimed limitations are directed to a process or directed to a property of a product (etching solution). The said limitations appear to be directed toward a process, although the preamble of the base claim 1 is directed to properties of a product (etching solution). For the purpose of examination, claims 1-14 would be examined as a product (etching solution).

In claim 5, line 1;

In claim 6, line 1;

In claim 7, line 1;

In claim 8, line 1;

In claim 9, line 1;

In claim 10, line 1;

In claim 13, lines 1-2;

In claim 14, lines 1-2; and

In claim 15, lines 1-2; "the weight ratio" lacks antecedent basis.

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In claim 5, line 1-2, "the weight ratio of HF : isopropyl : water" lacks antecedent basis.

In claim 6, line 1-2; "the weight ratio of HF : acetic acid : water" lacks antecedent basis.

In claim 7, line 1-2; "the weight ratio of HF : tetrahydrofuran : water" lacks antecedent basis.

In claim 8, line 1-2; "the weight ratio of HF : acetone : water" lacks antecedent basis.

In claim 9, line 1-2; "the weight ratio of HF : methanol : water" lacks antecedent basis.

In claim 10, line 1-2; "the weight ratio of HF : ethanol : water" lacks antecedent basis.

In claim 13, line 1-2; "the weight ratio of HF : HCl : water" lacks antecedent basis.

In claim 14, line 1-2; "the weight ratio of HF : HNO₃ : water" lacks antecedent basis.

Claim Rejections - 35 USC § 102/103

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

8. Claims 1, 11, 15 and 16 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Li (US 5,783,495).

Li teaches an etching solution comprising hydrofluoric acid (column 6, lines 47-50) and using the etching solution to etch boron silicate glass and thermal oxide at temperatures ranging from 100° to 40°C and more particularly from 15° to 25°C, (column 5, lines 37-50). Li also teaches a ratio of an etch rate of boron silicate glass film/ an etch rate of a thermal oxide film at 25°C is 10 ($378 \text{ Åmin}^{-1}/36 \text{ Åmin}^{-1}$) (column 6, lines 52-54 and 56-59 and Table 1). The above reads on an etching solution comprising hydrofluoric acid, **in claim 1**.

In addition, the presently claimed property, wherein a ratio of an etch rate of a boron silicate glass film (BSG) or boron phosphosilicate glass/an rate of a thermal oxide film (THOX) at 25 C is 20 or higher, **in claim 1** would obviously have been provided by

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as a result of using Li's etching solution in etching the same material under the same operating conditions as those of the claimed invention.

The said above reads on an inorganic acid, **in claim 11**.

Li further teaches an etching method used in fabricating semiconductor devices (column 1, lines 13-19), which reads on a method for producing an etched article by etching an article to be etched with the etching solution, **as in claim 15** and an etched article, which is obtainable by the said method **as in claim 16**.

Claim Rejections – 35 USC § 103

9. Claims 2-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Li ('495) as applied to claim 1 above, and further in view of Grant et al. (US 5,439,553).

Li differs in failing to teach a solvent in the etching solution has a relative dielectric constant of 61 or lower, **in claims 2-3**.

Grant teaches an etchant comprising HF along with organic materials such as methanol, isopropanol, acetone and acetic acid (column 5, line 63 – column 6, line 6 and claims 3-5) and further teaches these solvents prevent condensation and other contaminants on the oxide surface (column 3, lines 43-54)

It would have been obvious to one skilled in the art at the time of the claimed invention to modify Li by employing a solvent having a dielectric constant of less than 61 as taught by Grant for the purpose of preventing deposition of contaminants of the substrate (Grant, column 3, lines 43-54).

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Li in view of Grant differ in failing to teach in failing to specify the % by weight ratio of the etchant components as recited **in claims 4-10**.

It would have been obvious to one having ordinary skill in the art at the time of the claimed invention to modify Li in view of Grant by selecting any combination of the disclosed % by weight ratios of the etchant, including those defined in applicants' claims because such ratios are known to be suitable in etching solutions.

10. Claims 12-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Li ('495) as applied to claim 11 above, and further in view of McNeilly et al. (US 5,294,568).

Li differs in failing to teach the etching solution comprises an inorganic acid that has a pK_a of 2 or lower, **in claim 12** and the etching solution wherein the percent by weight ratio of HF: HCl:water is 0.01-50:1-36:0-99, **in claim 13**.

McNeilly teaches an etching solution comprising HCl (same as applicant's organic acid having a $pK_a = -8$, Specification, page 5, lines 7-9), 38.4 wt % HF from HF/H₂O and 20.2 wt % HCl from HCl/H₂O (column 6, lines 26-30, which lies within the range of the ratio of HF:HCl:water, which is 0.01-50:1-36:0-99. McNeilly further teaches exposing a substrate to hydrogen halide vapor and water vapor under appropriate conditions and long enough to remove the native oxide but not long enough to remove any significant amount of other oxides (column 2, lines 49-54).

It is the examiner's position that it would have been obvious to one having ordinary skill in the art at the time of the claimed invention to modify Li's etchant by

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employing an inorganic acid as taught by McNeilly for the purpose of selectively removing unwanted native oxide while etching the other oxide layers (McNeilly, column 2, lines 49-54).

11. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Li ('495) as applied to claim 1 above, and further in view of Wanlass (US 3,997,381).

Li differs in failing to specify the percent weight ratio of HF:HNO₃:water is 0.01-50:1-70:0-99.

Wanlass teaches an etching solution comprising of hydrofluoric (49% by weight), nitric (70% by weight), (column 7, lines 10-14), which encompasses the percent weight ratio of HF:HNO₃:water is 0.01-50:1-70:0-99.

It would have been obvious to one having ordinary skill in the art at the time of the claimed invention to modify Li's etchant by employing an inorganic acid as taught by Wanlass for the purpose of selectively etching doped oxide and undoped oxides (see Wanlass, column 7, lines 14-20).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lynette T. Umez-Eronini whose telephone number is 571-272-1470. The examiner is normally unavailable on the First Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on 571-272-1465.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

ltue

March 19, 2004

NADINE G. NORTON
SUPERVISORY PATENT EXAMINER

A handwritten signature in black ink, appearing to read 'Norton', is written below the printed name and title.